PATENT COOPERATION TREA

CONFIRMATION

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

Ella Cheong Mirandah &Sprusons PTE LTD
111 North Bridge Rd
#22-01 Peninsula Pl.
179098 Singapore

RECEIVED
08 FEB 2005
BY: ASL SN

PCT

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

	Date of mailing *day/month/year* 31 JAN 2005
Applicant's or agent's file reference 10021SG4/KJR/ASL	IMPORTANT NOTIFICATION

International Application No.	International Filing Date	Priority Date
PCT/SG2003/000246	13 October 2003	14 October 2002

Applicant

AURIGIN TECHNOLOGY PTE LTD et al

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translations to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide

Name and mailing address of the IPEA/AU	Authorized officer
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	GREG POWELL Telephone No. (02) 6283 2308

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 10021SG4/KJR/ASL	**FOR FURTHER ACTION**	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416).
International Application No. **PCT/SG2003/000246**	International Filing Date *(day/month/year)* 13 October 2003	Priority Date *(day/month/year)* 14 October 2002
International Patent Classification (IPC) or national classification and IPC **Int. Cl.** [7] B23K 3/06, H01L 21/60		
Applicant AURIGIN TECHNOLOGY PTE LTD et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

   [X] This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 3 sheet(s).

3. This report contains indications relating to the following items:

   - I [X] Basis of the report
   - II [ ] Priority
   - III [ ] Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV [ ] Lack of unity of invention
   - V [X] Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI [ ] Certain documents cited
   - VII [ ] Certain defects in the international application
   - VIII [ ] Certain observations on the international application

Date of submission of the demand 19 April 2004	Date of completion of the report 27 January 2005
Name and mailing address of the IPEA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized Officer **GREG POWELL** Telephone No. (02) 6283 2308

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.
PCT/SG2003/000246

I. Basis of the report

1. With regard to the **elements** of the international application:*

- [ ] the international application as originally filed.
- [X] the description, pages **1-8,** as originally filed,
  pages , filed with the demand,
  pages , received on with the letter of
- [X] the claims, pages , as originally filed,
  pages , as amended (together with any statement) under Article 19,
  pages , filed with the demand,
  pages **9-11 ,** received on **14 January 2005** with the letter of **14 January 2005**
- [X] the drawings, pages **1/8-8/8 ,** as originally filed,
  pages , filed with the demand,
  pages , received on with the letter of
- [ ] the sequence listing part of the description:
  pages , as originally filed
  pages , filed with the demand
  pages , received on with the letter of

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
These elements were available or furnished to this Authority in the following language which is:

- [ ] the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- [ ] the language of publication of the international application (under Rule 48.3(b)).
- [ ] the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- [ ] contained in the international application in written form.
- [ ] filed together with the international application in computer readable form.
- [ ] furnished subsequently to this Authority in written form.
- [ ] furnished subsequently to this Authority in computer readable form.
- [ ] The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- [ ] The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

4. [ ] The amendments have resulted in the cancellation of:
   - [ ] the description, pages
   - [ ] the claims, Nos.
   - [ ] the drawings, sheets/fig.

5. [ ] This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).**

* *Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).*

** *Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report*

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-15	YES
	Claims		NO
Inventive step (IS)	Claims	1-15	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-15	YES
	Claims		NO

2. Citations and explanations (Rule 70.7)

NEW CITATION

US 5655704 A (SAKEMI et al) 12 August 1997

NOVELTY (N) & INVENTIVE STEP (IS)

Claims 1-15 meet the criteria for novelty, inventive step and industrial applicability. The prior art published before the priority date does not disclose a solder ball filling apparatus with a tilting base plate provided with a ball grid array template and a solder ball supply bin which moves over the template when the base plate is tilted in a first direction, and away from the template when the base plate is pivoted in the opposite direction.

The closest prior art is considered to be US 5655704. This document discloses a base plate (4) with a template (4a) therein. A solder ball supply bin (12) moves across the template and allows solder balls (3a) to fall into the openings of the template. However, there is no disclosure of tilting the base plate so that the solder ball bin moves towards, and away from, the template, and no suggestion to modify the apparatus of US 5655704 to allow it to do so.

CLAIMS

1. A solder ball filling apparatus comprising:

a base plate provided with a ball grid array template on one end having a plurality of locating holes extending therethrough for receiving solder balls, the base plate having pivotal movement about a pivot between a first pivot direction to move solder balls toward the ball grid array template and a second, opposite pivot direction to move solder balls away from the ball grid array template;

a solder ball supply bin provided on the base plate for holding solder balls therein and for depositing solder balls in one or more of the locating holes when the bin is located above the ball grid array template; and

a motor capable of moving the solder ball supply bin along the base plate toward and away from the ball grid array template.

2. A solder ball filling apparatus as claimed in claim 1, wherein the solder ball supply bin comprises two oppositely disposed side walls respectively connected by a rear side wall at one end and a pivoted ball gate at an opposite end, wherein during pivoting of the base plate in the second direction, the ball gate pivots upon contact with solder balls that have not moved away from the ball grid array template.

3. A solder ball filling apparatus according to claim 2, wherein the rear side wall is disposed at a distance relative to the pivoted ball gate such that when the bin slideably moves on the base plate the rear wall does not slide over the ball grid array template.

4. The apparatus according to claim 2, further comprising a sensing device positioned at both the ends of the base plate, at a height similar to the height of the pivoted ball gate from the base plate.

5. The apparatus according to Claim 4, wherein the sensing device is a through-beam sensor or a focused-beam reflective sensor.

6. The apparatus according to Claim 1, wherein the base plate is pivoted at an angle ranging from 5 to 40 degrees in the first pivot direction.

7. The apparatus according to Claim 1, wherein the base plate is pivoted at an angle ranging from 20 to 75 degrees in the second pivot direction.

8. The apparatus according to Claim 1, wherein the locating holes in the ball grid array template are in communication with a vacuum.

9. A method of filling a ball grid array template with solder balls, the ball grid array template being provided on one end of a base plate and having a plurality of locating holes extending therethrough, the base plate being capable of pivotal movement between a first pivot direction and a second, opposite pivot direction, and a solder ball supply bin being provided on the base plate that is capable of sliding thereon in the first and second pivot directions, the method comprising:

(a) providing solder balls in the solder ball supply bin;

(b) pivoting the base plate in the first pivot direction to allow solder balls located in the bin to move in the first pivot direction;

(c) moving the solder ball supply bin over the base plate in the first pivot direction to the ball grid array template to thereby allow solder balls to fill one or more of the locating holes;

(d) pivoting the base plate in the second pivot direction to allow solder balls located in the bin to move in the second pivot direction away from the ball gird array template; and

(e) moving the solder ball supply bin over the base plate in the second pivot direction.

10. The method according to claim 9, wherein the bin is capable of holding solder balls between two oppositely disposed side walls respectively connected by a rear side wall at one end and a pivoted ball gate at an opposite end, wherein during step (e) the ball gate pivots upon contact with solder balls that have not moved away from the ball grid array template.

11. The method according to Claim 9, wherein the base plate is pivoted at an angle ranging from 5 to 40 degrees in the first pivot direction.

12. The method according to Claim 9, wherein the base plate is pivoted at an angle ranging from 20 to 75 degrees in the second pivot direction.

13. The method according to Claim 9, further comprising pivoting the base plate to a horizontal position after step (e).

14. The method of Claim 9, wherein the first pivot direction is a clockwise direction.

15. The method of Claim 9, wherein the second pivot direction is an anti-clockwise direction.